REMARKS/ARGUMENTS

In response to the objection to the drawings set forth in paragraph 3 of the Office Action, most of the objected to reference characters have been removed from the drawings. However, the reference character "a" in Figs. 1, 3 and 12 has been retained because it is referred to at lines 6 and 7 of paragraph 41. Reference characters "5" and "6" in Fig. 8 have been left because they are described at line 8 of paragraph 46.

In order to overcome the drawing objection noted in paragraph 4 of the Office Action, the reference character "P" has been eliminated and the word "load" has been relocated in its place.

A substitute specification is submitted herewith.

Claims 1-6 have been canceled and replaced by new Claims 7-12 that are believed to overcome all of the rejections under 35 U.S.C. 112.

With respect to the prior art rejections, Claim 7 now clearly sets forth that the height dimension of the strand is greater than the width dimension and that the height dimension is oriented between 45° and 90° relative to the face of the meshed shape net. The advantages of this dimensional relationship and orientation relative to the face are set forth in great detail in the specification. This feature is not disclosed in any of the references cited by the Examiner and it is submitted that none of the claims is anticipated by the prior art of record.

It is believed that the application is now in condition for allowance and it is requested that the Examiner withdraw the rejections and pass the application to issue.

However, if further issues remain, it is requested that the Examiner telephone the undersigned at 260-460-1692.

Respectfully submitted,

John F. Hoffman
Registration No. 26,280

Attorney for Applicants

JFH/nw

BAKER & DANIELS
111 East Wayne Street, Suite 800
Fort Wayne, IN 46802
Telephone: 260-424-8000
Facsimile: 260-460-1700

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Name of Registered Representative

Signature

November 11,2 003
Date

~~DESCRIPTION~~

Clothing Material With Foamed Strand Welded Together Therein

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a clothing material in which a foamed net in a meshed shape that is constituted with a plurality of foamed strands intersected and simultaneously welded together at intersection points is inserted between a pair of outer ~~clothes~~clothing layers.

[0003] 2. Description of the Prior Art

[0004] Textiles in which the above-mentioned foamed net in a meshed shape is contained as a main material (textiles in which a foamed net is sandwiched between outer cloth made of synthetic fibers, such as nylon and Tetron, hemp, cotton etc., and lining cloth ~~etc.~~and the like) is lightweight, and excels in warmth retaining property. These textiles are commonly used in casual wear, life ~~jacket (life vest)~~jackets and vests, sportswear, etc. as is described in JP-A No. 10-202808. Foamed strand made of polyethylene, polystyrene, etc. is configured in a ~~shape of a~~ meshed shape, and then this foamed net ~~obtained~~ is welded and combined. ~~These~~Such foamed nets are generally used to cover and protect soft and fragile materials, such as fruits and vegetables, or often used as cushioning materials ~~serving~~ for partitioning during transportation.

[0005] Moreover, what is disclosed in JP-A No. 11-5282 etc. is known as a textile itself made of a foamed net as a main material. In the foamed net in this case, foamed strands having thin filament-like shape are arranged so that they may be mutually parallel at regular intervals, and then strands obtained are piled up to constitute a meshed shape. As a cross section form of the foamed strand, a round shape shown in Fig. 11(a) and a flat elliptical shape (or oval shape) shown in Fig. 11(b) are commonly used.

[0006] In a foamed net adopted in conventional textiles, foamed strands are configured in a meshed shape and clearance is formed among adjacent foamed strands so that the foamed net may have air layers that ~~demonstrates~~ create a warmth retaining property ~~may be secured~~ and as a result a lightweight net ~~may be obtained simultaneously.~~is realized. Then~~,~~ when a more advanced warmth retaining property, cushioning property, and buoyancy are required, some means may be used in which foamed nets inserted into textiles are piled up to form a double layer, or warmth retaining and heat insulating layers with different materials are further added, as is described in the above-mentioned ~~official gazette~~document (JP-A No. 11-5282). For example, when a foamed net is used as a material for a life jacket, in order to acquire specific buoyancy, a plurality of

foamed nets are used in laminated form in tw or more layers, or a tubular-shaped net, often used for the protection of fruits etc, is used (referred to as "cap" in the case where it is used for fruits).

[0007] However, the use of plurality of warmth retention and heat insulating layers, such as foamed net, increases ~~both~~the production process of textiles and materials, which causes an obvious cost rise. As a result, an increase in ~~process~~processing has a simultaneous ~~fault~~disadvantage of lengthening ~~a~~ the lead-time in production line~~.~~s. Therefore, many improvements must be made in order to increase the warmth retaining property, cushioning property and further buoyancy function effectively.

[0008] ~~Then, in~~ In order to improve buoyancy and heat insulating function in the present foamed net, without two or more layers of lamination, as shown in Fig. 11(b), it is proposed that the intersection angle between upper and lower foamed strands s1 and s2 ~~is~~ be made larger (or an oblong section form may be adopted) so that a cross section form of welded foamed strands of s1 and s2 at intersection point k may have ~~a~~the shape of a long ellipse-like form with width w.

[0009] In this method, a cost rise and increase in weight are caused because the textiles ~~become~~ to have a large number of strands per unit area (or have a large volume per unit length of strand). Moreover, since a wide welded area at intersection point k induces a ~~fall~~decrease in flexibility and as a result many disadvantages ~~are arisen~~arise, this method is difficult to be realized.

SUMMARY OF THE INVENTION

[0010] An object of the present invention is, in garments with foamed net used as a clothing material (inter-lining), to provide clothing materials that ~~give a~~ are light-weight and easy-moving~~,~~ and have a high warmth retaining property, high cushioning property and high buoyancy function without spoiling the wearer's feeling in wear, and that do not ~~give~~cause a cost ~~rise~~increase or the above-mentioned disadvantages in production.

~~**[0011]** [Constitution and function]~~

[0012] ~~Constitution of claim 1 shows that a~~The invention provides clothing material in which a foamed net in a meshed shape being constituted with a plurality of foamed strands intersected and simultaneously welded together at intersection points is used by being inserted between a pair of outer ~~clothes~~clothing layers, wherein in the ~~said~~ foamed net the ~~said~~ foamed strands are welded together so that the ~~said~~ foamed strands have cross section forms with different ratios of height ~~size~~dimension to width ~~size~~dimension, and simultaneously the longitudinal direction of the cross section form has an angle of 45 to 90 degrees to a face of the net in a meshed shape.

[0013] ~~According to constitution of claim 1, foamed~~Foamed strands having cross section forms of ~~ellipse~~elliptical shape, or of Japanese hand drum form, etc. with different ratios of height ~~size~~ to width ~~size~~ are welded so that a longitudinal direction of the cross section may have an angle of 45 to 90 degrees to a face of ~~a~~ the net in a meshed shape. Thus ~~a~~, the thickness of the foamed net increases and ~~an~~ the amount of the foamed strands per unit volume of the foamed net decreases, as compared with a case where the longitudinal direction of the cross section may be parallel to the face of the net (oblong state) or with a case where the cross section form has a round shape. As a result, a clothing material is obtained that has a large ~~amount of~~ air layer in the net and that has a large amount of elastic deformation in a direction orthogonal or almost orthogonal to the face of the net.

[0014] ~~And since~~Since a foamed net of the present invention has a welded area equal to a conventional net with a circular cross section of foamed strands, flexibility as a clothing material is not impaired with very ~~few~~little cost ~~rises~~.increase. Therefore, warmth retaining property (heat insulating nature), buoyancy, flexibility and cushioning property sufficient ~~as~~ for textiles are obtained by only ~~by~~ one layer, even if foamed nets are not double laminated ~~double~~ as ~~is~~was done before. Besides, since a laminating process is not required, excellent productivity ~~(~~and workability~~)~~ may also be maintained.

[0015] ~~In a constitution of claim 2~~Furthermore, a cross section form of a foamed strand ~~in~~having the constitution ~~of claim 1 is~~ set ~~as~~ forth above may be almost elliptical. ~~In a constitution of claim 3,~~ Moreover, a cross section form of the foamed strand ~~in constitution of claim 1 is~~ may be configured so that an end of a vertical line of character T may be aligned at the intersection point ~~side.~~.

[0016] When the cross section form is ~~almost~~approximately elliptical, ~~a~~the foamed strand volume per unit length decreases, and a clothing material with better function ~~than~~ is obtained ~~in the constitution of claim 1 may be obtained.~~. Moreover, in the case where the cross section form has a shape such that an end of a vertical line of the character T may be aligned at the intersection point ~~side~~, a clothing material may be manufactured having a function in which a contact point with an outer cloth layer forms a flat face and ~~a shock of other things touched~~impact to the outer cloth is absorbed efficiently.

[0017] ~~In a constitution of claim 4, a~~A ratio of height ~~size~~ to width ~~size~~ of the foamed strand in the cross section form ~~is set~~ may be in a range of 1.1 or more and 4.0 or less~~, in the constitution of claims 1 to 3, and~~ as is described in detail in preferred embodiments, and the following functions

are provided. ~~That is, the~~The foamed strand becomes ~~to be~~ deformed by c mpression in a cross section longitudinal direction (in a direction orthogonal or almost orthogonal ~~direction~~ to the clothing material i.e. the face of the net), without buckling of the foamed strand, when an external force against a body to be protected and covered by clothing material is ~~given on~~ applied to the clothing material, i.e., the foamed net. Consequently, a clothing material may be obtained in which an outstanding cushioning property, based on the cross section form with ~~bigger~~larger height ~~size~~ than width ~~size~~ of the foamed strand, is effectively ~~demonstrated~~achieved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] Fig. 1 is a plan view showing a foamed net;

[0019] Fig. 2 is a plan view showing a cap for fruit;

[0020] Fig. 3 is a sectional view of a foamed net showing a cross section form of a foamed strand;

[0021] Fig. 4 is a sectional view of a foamed net showing another example of a cross section form of a foamed strand;

[0022] Fig. 5 is a view showing a form of a nozzle for molding a foamed strand as shown in Fig. 3;

[0023] Fig. 6 is a view showing an ~~inconvenient~~undesirable situation when using the nozzle of Fig. 5;

[0024] Fig. 7 is a sectional view showing a form of a nozzle ~~giving a~~providing the cross section form of Fig. 3;

[0025] Fig. 8 is a view showing a form of a nozzle for molding a foamed strand as shown in Fig. 4;

[0026] Fig. 9 is a sectional view ~~in welded part~~ showing ~~another form~~other forms of ~~a~~ foamed strand cross section ;

[0027] Fig. 10 is a sectional view ~~in welded part~~ showing ~~another form~~other forms of ~~a~~ foamed strand cross section;

[0028] Fig. 11 is a sectional view showing a cross section form of a conventional foamed net;

[0029] Fig. 12 is a perspective view partially in section showing a conventional foamed net;

[0030] Fig. 13 is a sectional view showing a form of a conventional nozzle;

[0031] Fig. 14 is a perspective view showing a textile according to the present invention;

[0032] Fig. 15 is a sectional view showing ~~a~~the constitution of ~~a~~ the textile shown in Fig. 14;

[0033] Fig. 16 is a ~~referential figure showing a~~ plan view of a vest; and

[0034] Fig. 17 is a ~~referential figure showing~~plan view of a jacket.

DETAILED DESCRIPTION OF THE INVENTION

[0035] Textile B that is an example of a clothing material according to the present invention is shown in Fig. 14, and the sectional view is shown in Fig. 15~~, respectively.~~. Textile B has a three-layer structure in which a foamed net 1 is inserted as the main material between outer materials (~~an~~ for example ~~of~~ outer cloth) 11, and lining cloth (~~an~~ for example ~~of~~ outer cloth) 12. The outer material 11 and the lining cloth 12 are made of synthetic fibers (nylon, Tetoron, etc.) and natural fibers, such as hemp, cotton, and olefinic foamed sheet and nonwoven fabric, etc. ~~Three of the~~ The outer material 11, foamed net 1, and lining cloth 12 are combined with various adhesives.

[0036] In textile B, a ~~constitution~~construction in which a foamed net 1 is inserted into a sheet processed into ~~a~~ the shape of a bag with outer ~~clothes~~clothing layers 11 and 12 made from the above-mentioned various materials of nylon etc., and a ~~constitution~~construction in which textiles with a structure of each of these are processed by quilting processing may be used. ~~As an example of use~~Examples of clothes using these textiles B, are sportswear, casual wear, life ~~jacket~~jackets (life vests), and others ~~are mentioned.~~. As examples for reference of the products using the textiles B in the present invention, a vest is shown in Fig. 16 and a jacket is shown in Fig. 17.

[0037] In addition, either an open cell or a closed cell may be used as ~~a~~ the cell in a foamed material that ~~constitute~~constitutes foamed strands s1 and s2 in case of a casual wear, and a closed cell is suitable in the case of a life jacket because it requires buoyancy.

[0038] Next, a foamed net 1 used for a textiles B as ~~a~~ the main material will be explained in detail. A foamed net 1 is shown in Fig. 1, and a cap A for wrapping and protecting fruits etc. is shown in Fig. 2~~, respectively.~~. A foamed net 1 has a structure of meshed shape in which a plurality of foamed strands s1 and s2 are mutually intersected, and the foamed strands s1 and s2 overlapped at intersection ~~point~~points k are welded together. When a foamed net 1 is connected in a loop to ~~give~~ a cylindrical shape ~~of a cylinder~~, a cap A is obtained. In some ~~cap~~caps A for wrapping and protecting fruits etc. as ~~reference~~an example, an arranged pitch (refer to P of Fig. 12) of strands in the bottom of the cap A is set narrower than an arranged pitch in ~~an~~ the upper, lower, and middle ~~part~~parts of the net so that spreading caused by elastic deformation may not occur and that fruits etc. inside may not fall out from the bottom of the cap A.

[0039] As shown in Fig. 2 and Fig. 3, both the first foamed strand s1 and the second foamed strand s2 are elliptical, and have the same cross section form and size mutually, and each cross section form of foamed strands s1 and s2 has a different ratio S of height ~~size~~ to width ~~size~~, and at the same time the first and the second foamed strands s1 and s2 are mutually welded so that a

longitudinal direction of the cross section form orthogonally intersects ~~to~~ a face 2 of ~~a net in a~~ the meshed shape~~.~~ net. In the case of a cross section of elliptical shape, both of the first and the second line segment L1 and L2 that connect a welded section (welded point) u in an intersection point k and centroids g1 and g2 of a sectional views of each of the foamed strands s1 and s2 respectively are orthogonally configured to intersect to a face 2 of ~~a net in a~~the meshed shape~~.~~ net.

[0040] In addition, foamed strands s1 and s2 may be welded so that a longitudinal direction of the cross section form may have an inclined state (refer to dashed line of Fig. 15) of from 45 to less than 90 degrees to ~~a~~the face 2 of a net in a meshed shape. In this case, the ~~said~~ first and second line segments L1 and L2 have an inclination corresponding to the angle of inclination.

[0041] A face 2 of ~~a~~ the net represents a virtual plane made by ~~a~~ foamed net 1 put in a flat state and also represents a plane corresponding to a bottom plane of a flat plate put on the net 1. Moreover, when cap A is used for an object to be protected of the shape of a cylinder, such as a wineglass, ~~a~~its cylindrical face is equivalent to ~~a~~ the face 2 of a net. And "a" is a gap between adjacent strands and at the same time is an air layer (with gas permeability) to ~~secure a~~ provide buoyancy. In Fig. 3, a strand currently drawn on the upper position ~~on~~ of the drawing is the first foamed strand s1 in a side that touches outer material 11, and a strand currently drawn on the lower position is the second foamed strand s2 in a side that touches lining cloth 12~~.~~ (Fig. 15). In case of a cap A, ~~an~~ the outside strand is the first foamed strand s1, and ~~an~~ the inside strand is the second foamed strand s2.

[0042] When a ratio S is defined as a ratio of height ~~size~~ to width ~~size~~, H as height ~~size~~ and W as width ~~size~~, in a cross section form of foamed strands s1 and s2, then S=H / W. In order to provide ~~an~~ excellent buoyancy, cushioning property, warmth retaining property, etc., S is preferably 1<S<5 (W<H<5W). Moreover, S is preferably set in a range of 1.1<S<4.0 (1.1 W<H<4.0 W) so that foamed strands s1 and s2 are not buckled even if a force in a direction orthogonal or almost orthogonal to ~~a~~ the face 2 of ~~a~~ the net is ~~given.~~ applied.

[0043] The reason is that when S is 1.1 or less excellent buoyancy, cushioning property and warmth retaining property are difficult to ~~be obtained~~ obtain, and when S is 4.0 or more the foamed strands ~~are~~ can possibly buckled~~.~~. By setting S in a suitable range, deformation by compression is carried out in a longitudinal direction of ~~a~~ the cross section without buckling of foamed strands s1 and s2, and as a result a textile B that also has an effective cushioning property may be obtained. In addition, a more preferable value for acquiring effective buoyancy without buckling etc. is 1.5<S<2.5 (1.5 W<H<2.5 W).

[0044] Thus, by using foamed strands s1 and s2 with a long cross section in the direction of height, there is provided an advantage that warmth retaining property, buoyancy and cushioning property ~~in~~ at a level obtained by a conventional double cap may be obtained by a single cap. In this case, when foamed strands s1 and s2 with a conventional circular cross section shown in Fig. 11(a) are compared with the foamed strands s1 and s2 of the present invention with elliptical cross section shown in Fig. 3 on condition that both have the same buoyancy, cushioning property and warmth retaining property, the strands of the present invention require a smaller cross-~~section~~sectional area, and as a result a lightweight property is attained.

[0045] Moreover, ~~a bigger~~an improved cushioning property is naturally obtained in a foamed net 1 in which foamed strands s1 and s2 having a cross section form set in a ratio of height ~~size~~ to width ~~size~~ with larger height than width. However, since ~~a~~the contact area with an outer material 11 or lining cloth 12 is comparatively smaller than expected, the strand has a small contact frictional resistance ~~to handle~~enabling it to be handled easily in production ~~process~~ and also to increase ~~in~~its workability.

[0046] In order to prepare foamed strands s1 and s2 that have ~~a~~the cross section form of elliptical shape shown in Fig. 3, it is preferable to perform the foaming using out and in nozzles 3 and 4 that have a form shown in Fig. 5 (nozzles 3 and 4 have the same ~~form~~shape). In order to prepare foamed strands s1 and s2 that have Japanese hand drum type (gourd form) of cross section form shown in Fig. 4, it is preferable to perform foaming using out and in nozzles 5, 6 with a form similar to the gourd form shown in Fig. 8. Moreover, as long as foamed strands s1 and s2 with the cross section form shown in Fig. 3 or Fig. 4 are obtained, nozzles with any form may be used.

[0047] By rotating nozzles 3 and 4 with the form shown in Fig. 5, foamed strands s1 and s2 with a shape of almost elliptical shape inclined in the rotation direction, as shown by the dashed ~~line~~lines in Fig. 6, are obtained. The description above shows that an improvement of the nozzle is required in order to set a degree α of an angle of inclination of foamed strands s1 and s2 to ~~a~~the face of ~~a~~ net 2 into 45 to 90 degrees.

[0048] Namely, when rotation is made to work using nozzles 3 and 4 shown in Fig. 5, it is necessary that adjustment is made so that the degree α of ~~an~~the angle of inclination to the face 2 of ~~a~~the net of foamed strands s1 and s2 may be in a range of 45 to 90 degrees. For this purpose, out and in nozzles 7 and 8 with a form as shown in Fig. 7(a) and out and in nozzles 9 and 10 with a form as shown in Fig. 7(b) are used. It is possible to maintain the degree ~~a~~α f ~~an~~the angle of inclination of foamed strands s1 and s2 in the range of 45 to 90 degrees, by changing an angle θ of

the nozzles in Fig. 7. Rotation of nozzles 7, 8, 9, and 10 gives a product in which across section (almost elliptical cross section) with almost oval form is orthogonal to ~~a~~ the face 2 of ~~a~~ the net, as the dashed ~~line~~lines in Fig. 7 show~~s~~, and as a result, a high cushioning property is demonstrated. Moreover, there is a tendency for the cushioning property to be remarkably decreased if the degree α of ~~an~~ the angle of inclination is less than 45 degrees.

[0049] The inclination may be cancelled by the reduction of a value of a reverse angle ,θ, although ~~a~~ an increase in rotation velocity of nozzles 7 and 8 enlarges the inclination of the strands. However, since the out nozzle 7 and in nozzle 8 rotate~~s~~ in ~~the~~ a different direction mutually, a decrease in adhesion strength of welded part u may be sometimes induced based on ~~a~~the form of ~~a~~ the product and on ~~a~~ the time of contacting between the out nozzle 7 and the in nozzle 8 and on ~~a kind~~ the type of raw materials, etc. Especially adhesion strength in ~~a~~ the side of the rotation direction of the nozzles 7 and 8 may be decreased.

[0050] ~~Then, contact~~Contact portions between the out nozzle 7 and 9 and the in nozzle 8 and 10 in ~~a~~ the side of the rotation direction of the nozzles 7, 8, 9 and 10 are lengthened and expanded (portions shown in Fig. 7 with slashes), as is represented by D in Fig. 7, so that an improvement in adhesive strength is obtained. In addition, a form like a rectangle ~~and~~ or trapezoid of the contact portion E may be adopted as ~~a~~ the form of the contact portion D. It is preferable that a resin with large MFR, such as EVA, elastomer, metacelon resin, etc. is added ~~in~~ as a raw material to improve adhesive property.

[0051] ~~Closed cell~~Either closed or open ~~cell is~~ cells are acceptable as air cells that constitute foamed strands s1 and s1 and s2. As a material for foamed strands s1 and s2, PVC, poly-olefinic resins, such as polyethylene and polypropylene, polystyrene derived resin, polyvinyl chloride derived resin, EVA, thermoplastic elastomer (TPE), metacelon resin, etc. ~~are mentioned.~~ are suitable. For example, polyethylene and polypropylene are preferable.

[0052] Two or more kinds of resins may be mixed and used together. Moreover, in order to obtain improvement in processing when discarded, foamed strands of biodegradable resins, such as poly lactic acid, starch synthetic macromolecule blended polymer, aliphatic polyester, polycaprolactone, cellulose, and PVA, and ~~mixture~~mixtures of these resins may also be used. As cellular regulators, talc, inorganic foaming agent, and organic foaming agent are mentioned. As additives, antibacteria medicine, fungicide, adsorbent, deodorant, antistatic agent, shrinkage inhibitor, antioxidant, UV absorbent, far-infrared generating substance, etc. are mentioned. As an

adsorbent and a deodorant, an inorganic substance, such as zeolite and tourmaline, and ceramics, ~~may be mentioned.~~are suitable.

[0053] Foamed strands s1 and s2 are prepared using the above-mentioned components foamed with a foaming agent. General manufacturing methods ~~of~~ for foamed strand may be used for manufacturing the foamed strand of the present invention. For example, a method may be ~~mentioned~~employed in which a foaming agent is mixed with a resin composition constituting the foamed strand and the mixture is then foamed. As the formation method, the extrusion molding method is preferably used.

[0054] ~~As foaming~~Foaming agents used for the above-mentioned foaming object, may include for example~~:~~: inorganic foaming agents, such as carbon dioxide, nitrogen gas, and water; organic foaming agents, such as hydrocarbons~~, as~~ including pentane, isopentane, and butane, and chlorinated hydrocarbons, such as ~~fron,~~alternatives for chlorofluorocarbon, methylene chloride, and methyl chloride~~ may be mentioned.~~. Moreover, as ~~chemical~~chemically reactive type foaming agents, for example, sodium hydrogencarbonate, ~~mixture~~mixtures of inorganic substances, such as sodium hydrogencarbonate and acid, azo compounds, nitroso compounds, triazole compounds, etc. may be ~~mentioned.~~used. These foaming agents may be used independently or two or more may be used together. When ~~forming~~foaming agents of high foaming magnification are required, it is preferable to use hydrocarbons, such as pentane~~ and~~, butane, ~~and fron,~~ carbon dioxide, nitrogen gas, and water, etc.

[0055] The amount of combination of a foaming agent used in manufacturing a foamed strand is not especially limited, but is suitably set according to a ~~kind of~~ the type of foaming agent to be used or to a desired foaming magnification, etc. Although a foaming magnification of the foamed strand is not ~~either~~ limited ~~especially~~, it is ~~preferable~~ preferably 5 to 100 times and more preferably 20 to 70 times. A small foaming magnification causes a decrease in elasticity, and an excessive foaming magnification tends to induce a decrease in strength. In the above-mentioned foamed object, additionally, inorganic substances, such as talc, calcium carbonate, aluminum hydroxide, and boric acid, may be used as a cellular regulator. The amount of the above-mentioned cellular regulator used is not especially limited.

[0056] In molding of foamed strands s1 and s2 by the present invention, molding conditions, such as extrusion conditions, are not especially limited, and the combination method of each component is not limited~~,~~ either. Each component is simultaneously or in consecutive order blended and is mixed accompanied by heating at the time of molding. As a mixing method, a

general stirring system may be used. After mixing each component together and ~~moldedm~~ lding into desired form, such as the shape of a pellet, a foaming process may be carried out.

[0057] As a manufacturing method of foamed strands s1 and s2, a tandem extruding machine in which two sets of extruding machines are combined in series is used. The ~~said~~ thermoplastic resin and a cellular regulator are supplied to the first extruding machine and a foaming agent is injected in from a middle path of the first extruding machine to obtain a foaming molten mixture. The molten mixture is cooled in the second extruding machine to a suitable temperature for the formation of air bubbles, and subsequently this molten mixture is extruded under atmospheric pressure from nozzles attached at the tip of the extruding machine to obtain foamed strands.

[0058] Out nozzle 9 and in nozzle 10 of Fig. 7(b) are attached in a nozzle, and manufacturing of strands is performed. A form of nozzles is not especially limited. That is, in nozzle 4 and out nozzle 3 in the tip of a rotating dice are rotated in ~~the~~ different ~~direction~~directions mutually, and a foamed net in a meshed shape is obtained. After a net taking-up machine takes up the foamed net ~~1 obtained, the~~, net 1 is cut into specified size. Moreover, it is also possible to ~~give the~~ produce strands slits at the time of extrusion, to obtain a specified size after being taken up by a taking up belt followed with a cutting process.

[0059] ~~[Another~~Other Embodiments~~]~~

[0060] As a pair of outer clothes constituting surface material of textile B, a pair of outer ~~material~~materials 11 and 11 or a pair of ~~cloth~~cloths 12 and 12 may be used, other than a pair of outer ~~material~~materials 11 mentioned above and lining cloth 12. And moreover a constitution in which one interior material ~~of one~~ layer or two or more are laminated in the foamed net 1 side of the outer material 11 or lining cloth 12 may also be used, and various ~~modification is~~ modifications are possible for thickness, number, quality of the material, kind, etc. When a high waterproof property is required, waterproofing treatment is preferably given by applying synthetic resin onto the outer material 11 and lining cloth 12. In addition, bags, such as rucksack, footwear, pole case, etc. types are mentioned as goods utilizing buoyancy of clothing material B.

[0061] ~~In~~ For a foamed net 1 contained in textile B, the following (1) to (8) are mentioned as examples of ~~an~~other cross section ~~form~~forms of foamed strands s1 and s2.

[0062] (1) As shown in Fig. 9(a), ~~a~~the shape of character T and of inversed character T; wherein a leg of the T is welded to the T of the other array.

[0063] (2) As shown in Fig. 9(b), ~~a~~the shape of character L and of inversed character L.

[0064] (3) As shown in Fig. 9(c), the cross section form of the first foamed strand s1 is ~~a~~the shape of character T, and the cross section form of the second foamed strand s2 is ~~a~~the shape of a straight line (a shape of the character I).

[0065] (4) As shown in Fig. 9(d), the cross section form of the first foamed strand s1 is ~~a~~the shape of character L, and the cross section form of the second foamed strand s2 is ~~a~~the shape of a straight line (a shape of the character I).

[0066] (5) As shown in Fig. 10(e), ~~a~~the shape of the character V and of the inversed character V.

[0067] (6) As shown in Fig. 10(f), ~~a~~the shape of the character U and of the inversed character U.

[0068] (7) As shown in Fig. 10(g), ~~a~~the shape ~~of~~of the character Y and of the inversed character Y.

[0069] (8) As shown in Fig. 10(h), the cross section form of the first foamed strand s1 is ~~a~~the shape of an ellipse with larger height than width, and the cross section form of the second foamed strand s2 is ~~a~~the shape of an ellipse with larger width than height.

[0070] Also in all of these foamed strands s1 and s2 with a cross section form shown in Fig. 9 or Fig. 10, a ratio S of height ~~size~~ to width ~~size~~ of those cross sections is set as 1<S (W<H), namely ~~a~~the height ~~size~~ H is larger than ~~a~~the width ~~size~~ W. Moreover, as shown in Fig. 10(h), only one strand of a pair of foamed strands s1 and s2 may have a larger height than width.

[0071] When a foamed net 1 used for clothing material (textile) B of the present invention is in contact with another object and an external force orthogonal or almost orthogonal to a face 2 of a net is ~~given~~applied, the net is configured and constituted so that compression deformation of the foamed strands s1 and s2 may be carried out in the longitudinal direction as a cross section form. That is, deformation is performed equally in right and left directions, without deformation in the transverse direction of the cross section form, when the compression direction load is ~~given.~~ ~~A~~applied. The form shown in Fig. 9(d) may also be used that has a flat upper surface and can be deformed in orthogonal or almost orthogonal direction to a face 2 of ~~a~~the net without being turned over~~, besides~~. Besides a bilaterally symmetrical form, such as ~~an~~the elliptical form shown in Fig. 1, Japanese hand drum form shown in Fig. 4, and character T form shown in Fig. 9~~.~~ can be employed. All ~~constitutions~~constructions that have a shape of the character V, character U, or character Y shown in Fig. 10 and ~~constitutions~~constructions shown in Fig. 9 mentioned above that ~~has~~have a cross section form having a larger height ~~size~~ H than a width ~~size~~ W are defined as "~~constitution~~construction in which a longitudinal direction ~~as~~of the cross section form is orthogonal or almost orthogonal to a face of ~~a~~the net in a shape of mesh".

Example 1

[0072] (1) Molding machine: 40 to 50 mm tandem extruder

[0073] (2) Material: polyethylene (product by TOSOH Corporation, MFR 24) 100 weight parts

[0074] (3) Cellular regulator: (Eiwa Chemicals, EE205) 1.0 weight parts

[0075] (4) Foaming gas: butane

[0076] (5) Nozzle: Form of Fig. 7(b) (a form from which the product of Fig. 3 is obtained) 250 H (the number of strands) A foamed net with closed cell and with 1m of width was obtained using the above-mentioned apparatus and materials of (1) to (5). In addition, ~~a~~the cross section form of the foamed strand is shown in Fig. 3, ~~a~~the whole form is shown in Fig. 2, and the size etc. is shown in Table 1.

[0077] Comparative Example 1

[0078] The same method as Example 1 was followed except that ~~a~~ the nozzle of Fig. 13 [a nozzle that ~~gives a~~produces the form ~~in~~ of Fig. 11 (a)] and 250 H (the number of strands) was used to obtain a net with a closed cell and with 1m of width.

Table 1

	Foamed strand size		Foaming magnification	Buoyancy (kg/m^2)	Area (m^2/7.5kg)
	w	h			
Example 1	2.5	4.7	34 times	4.4	1.71
Comparative Example 1	ϕ2.5		34 times	2.9	2.59

[0079] In Example 1, a product of foamed strand with ~~a~~ the form shown in Fig. 3 that has a ratio of height size to width size of h/w=1.88 was obtained, and in Comparative Example 1 a cylinder of diameter 2.5 was obtained. Both of the products had the same foaming magnification. In Example 1 a foamed net 1 having buoyancy with 1.52 times as much as in Comparative Example 1 was obtained. In order to acquire a buoyancy of 7.5 kg per ~~one piece of~~ life vest (a buoyancy standard of a life vest), in Example 1 only 66% of area of the product in Comparative Example 1 was required. At the same time the predetermined buoyancy was obtained without lamination processing.

[0080] In any clothing material according to ~~claim 1 to claim 4~~one form of the present invention, cross section forms of foamed strands in foamed nets contained as the main material are set so that ~~a~~the height ~~size~~ in a direction orth gonal or almost orthogonal to a face of ~~a~~the net is larger

than athe width ~~size.~~. An improvement in warmth retaining property (heat insulating property), buoyancy, flexibility, and cushioning property is attained, without spoiling productivity and with little or no increase in cost and weight using the above-mentioned methods. Clothing materials especially suitable for a life jacket in which buoyancy and compact volume is required, and for a sportswear in which outstanding warmth retaining property is required are provided.

[0081] In a clothing material according to claim ~~2~~8, outstanding buoyancy and warmth retaining property are obtained. And in a textile according to claim ~~3~~9, a lining cloth side (skin side) with a good feeling is given, and as a result a material suitable for clothes with excellent feeling of wearing is obtained. In a textile according to claim ~~4, a~~10, the possibility of buckling of a foamed net by an external force is almost overcome, ~~a possibility~~the tendency of the garment getting out of shape ~~as garment product~~ is decreased, and improved buoyancy, warmth retaining property, flexibility, and cushioning property are effectively ~~demonstrated~~achieved.